

## CLAIMS

What is claimed is:

- 1    1.    A method for deploying configuration instructions to security devices in order to
- 2    implement a security policy in a network, the method comprising the computer-implemented
- 3    steps of:
  - 4       detecting that implementing a security policy will cause an address translation
  - 5           alteration in a packet communicated between a management source and a
  - 6           plurality of security devices for implementing the security policy on the
  - 7           network;
  - 8       identifying, from among the plurality of security devices, one or more sets of security
  - 9           devices that have one or more configuration dependencies as a result of the
  - 10          address translation alteration if the security policy is implemented; and
  - 11          sending one or more configuration instructions from the management source to each
  - 12           of the one or more sets of security devices using an order that is determined
  - 13           based on the one or more configuration dependencies, resulting in
  - 14           implementing the security policy on the network.

1       2.     A method as recited in Claim 1, wherein sending configuration instructions from the  
2     management source to the one or more sets of security devices includes sending  
3     configuration instructions to multiple sets of security devices in parallel, wherein each of the  
4     multiple sets of security devices includes one or more configuration dependencies.

5       3.     A method as recited in Claim 2, wherein:  
6     identifying one or more sets of security devices that would each have one or more  
7     configuration dependencies as a result of the address translation alteration includes  
8     identifying a first network path that interconnects the management source and a first  
9     set of the one or more security devices in series, and a second network path that  
10    interconnects the management source and a second set of the one or more security  
11    devices in series; and  
12    sending configuration instructions to multiple sets of security devices in parallel includes  
13    sending configuration instructions to one or more security devices on the first network  
14    path and on the second network path concurrently, and independently of one another,  
15    using the order determined by the one or more configuration dependencies.

1    4.    A method as recited in Claim 1, wherein:  
2    identifying one or more sets of security devices that would each have one or more  
3       configuration dependencies as a result of the address translation alteration includes  
4       identifying a first network path that interconnects the management source and a first  
5       set of the one or more security devices in series, and a second network path that  
6       interconnects the management source and a second set of the one or more security  
7       devices in series;  
8       sending configuration instructions from the management source to each of the one or more  
9       sets of security devices includes sending configuration instructions to one or more  
10      security devices on the first network path and on the second network path in parallel;  
11      and  
12      sending configuration instructions to one or more security devices on the first network path  
13      includes sending configuration instructions to at least some of the security devices on  
14      the first network path sequentially, beginning with a first security device on the first  
15      network path that is ordered to be a last one of the security devices on the first  
16      network path to receive communications from the management source.

1    5.    A method as recited in Claim 1, wherein:  
2    detecting that implementing the security policy will cause an address translation alteration  
3       between a management source and a plurality of security devices includes detecting  
4       that implementing the security policy will cause a natural address translation between  
5       the management source and one of the plurality of security devices.

1       6.     The method as recited in Claim 1, wherein:  
2     detecting that implementing the security policy will cause an address translation alteration  
3              between a management source and a plurality of security devices includes detecting  
4              that implementing the security policy will cause a static address translation between  
5              the management source and one of the plurality of security devices.

1       7.     A method as recited in Claim 1, wherein:  
2     detecting that implementing the security policy will cause an address translation alteration  
3              between a management source and a plurality of security devices includes detecting  
4              that implementing the security policy will cause a tunneling translation between the  
5              management source and one of the plurality of security devices

1    8.    A method as recited in Claim 1, wherein:  
2    detecting that implementing the security policy will cause an address translation alteration  
3        between a management source and a plurality of security devices includes detecting  
4        that implementing the security policy will cause a natural address translation;  
5    identifying one or more sets of security devices that would each have one or more  
6        configuration dependencies as a result of the address translation alteration includes  
7        identifying a first network path that interconnects the management source and a first  
8        set of the one or more security devices in series; and  
9    sending configuration instructions from the management source to one or more sets of  
10        security devices includes sending configuration instructions to at least some of the  
11        security devices on the first network sequentially, beginning with a first security  
12        device on the first network path that is ordered to be a last one of the security devices  
13        on the first network path to receive communications from the management source.

1       9.     A method as recited in Claim 1, wherein:

2     detecting that implementing the security policy will cause an address translation alteration

3              between a management source and a plurality of security devices includes detecting

4              that implementing the security policy will cause a static address translation on the first

5              network path; and

6     identifying one or more sets of security devices that would each have one or more

7              configuration dependencies as a result of the address translation alteration includes

8              identifying a first network path that interconnects the management source and a first

9              set of the one or more security devices in series;

10    sending configuration instructions from the management source to one or more sets of

11              security devices includes sending configuration instructions to one or more security

12              devices on the first network path using the order of either (i) sending configuration

13              instructions to each security device of the first network path that is ordered in series

14              between the management source and the static address translation before sending

15              configuration instructions from the management source to any of the other security

16              devices that are ordered in series after the static address translation, or (ii) sending

17              configuration instructions to all of the other security devices that are ordered in series

18              after the static address translation before sending configuration instructions from the

19              management source to each security device that is ordered between the management

20              source and the static address translation.

1    10. A method as recited in Claim 1, wherein:

2    detecting that implementing the security policy will cause an address translation alteration

3        between a management source and a plurality of security devices includes detecting

4        that implementing the security policy will cause a tunneling translation on the first

5        network path; and

6    identifying one or more sets of security devices that would each have one or more

7        configuration dependencies as a result of the address translation alteration includes

8        identifying a first network path that interconnects the management source and a first

9        set of the one or more security devices in series;

10   sending configuration instructions from the management source to one or more sets of

11   security devices includes sending configuration instructions to one or more security

12   devices on the first network path using the order of either (i) sending configuration

13   instructions to each security device of the first network path that is ordered in series

14   between the management source and the static address translation before sending

15   configuration instructions from the management source to any of the other security

16   devices that are ordered in series after the static translation, or (ii) sending

17   configuration instructions to all of the other security devices that are ordered in series

18   after the static translation before sending configuration instructions from the

19   management source to each security device that is ordered between the management

20   source and the tunneling translation.

1    11. A method for deploying configuration instructions to security devices in order to  
2    implement a security policy in a network, the method comprising the computer-implemented  
3    steps of:

4                 detecting that the security policy creates a change of one or more configuration  
5                 dependencies as compared with an existing security policy, each configuration  
6                 dependency corresponding to at least a first security device having to be  
7                 configured before a second security device is configured in order for the first  
8                 security device to receive its configuration instructions for implementing the  
9                 security policy from a management source; and  
10                deploying configuration instructions to one or more security devices to implement the  
11                security policy according to an order determined by the one or more  
12                configuration dependencies.

1    12. A method as recited in Claim 11, wherein deploying configuration instructions  
2    includes deploying, for a network path containing at least a first configuration dependency of  
3    the one or more configuration dependencies, configuration instructions to a first security  
4    device of the first configuration dependency before deploying configuration instructions to a  
5    second security device of the first configuration dependency, wherein the first security device  
6    has to be configured before the second security device in order for the first security device to  
7    receive its configuration instructions for implementing the security policy from the  
8    management source.

1    13.    A method as recited in Claim 11, further comprising creating a schedule to implement  
2    the security policy to account for the change in the one or more configuration dependencies,  
3    and wherein deploying configuration instructions to one or more security devices includes  
4    using the schedule to deploy the configuration instructions.

1    14.    A method as recited in Claim 13, wherein deploying configuration instructions  
2    includes deploying in parallel the configuration instructions to each of the first security  
3    devices in the one or more configuration dependencies.

1    15.    A method as recited in Claim 11, wherein detecting that the security policy creates a  
2    change of one or more configuration dependencies from an existing security policy includes  
3    detecting the addition, deletion or modification of an address translation in a network path  
4    between the one or more security devices and the policy manager.

1       16. A method as recited in Claim 14, further comprising detecting the addition, deletion  
2       or modification of the address translation selected from an address translation type consisting  
3       of a natural address translation type, a reverse address translation type, and a tunnel  
4       translation.

5       17. A computer-readable medium for deploying configuration instructions to security  
6       devices in order to implement a security policy in a network, the computer-readable medium  
7       carrying instructions for implementing the steps of:

8              detecting that implementing a security policy will cause an address translation  
9              alteration in a packet communicated between a management source and a  
10             plurality of security devices for implementing the security policy on the  
11             network;  
12             identifying, from among the plurality of security devices, one or more sets of security  
13             devices that have one or more configuration dependencies as a result of the  
14             address translation alteration if the security device is implemented; and  
15             sending one or more configuration instructions from the management source to each  
16             of the one or more sets of security devices using an order that is determined  
17             based on the one or more configuration dependencies, resulting in  
18             implementing the security policy on the network.

1       18. A computer-readable medium as recited in Claim 17, wherein instructions for sending  
2       one or more configuration instructions from the management source to each of the one or  
3       more sets of security devices include instructions for sending configuration instructions to  
4       multiple sets of security devices in parallel, wherein each of the multiple sets of security  
5       devices includes one or more configuration dependencies.

1       19. A computer-readable medium as recited in Claim 18, wherein:  
2       instructions for identifying one or more sets of security devices that would each have one or  
3       more configuration dependencies as a result of the address translation alteration  
4       include instructions for identifying a first network path that interconnects the  
5       management source and a first set of the one or more security devices in series, and a  
6       second network path that interconnects the management source and a second set of  
7       the one or more security devices in series; and  
8       instructions for sending one or more configuration instructions to multiple sets of security  
9       devices in parallel include instructions for sending configuration instructions to one or  
10      more security devices on the first network path and on the second network path  
11      concurrently, and independently of one another.

1    20. A computer-readable medium as recited in Claim 17, wherein:  
2    instructions for identifying one or more sets of security devices that would each have one or  
3    more configuration dependencies as a result of the address translation alteration  
4    include instructions for identifying a first network path that interconnects the  
5    management source and a first set of the one or more security devices in series, and a  
6    second network path that interconnects the management source and a second set of  
7    the one or more security devices in series;  
8    instructions for sending one or more configuration instructions from the management source  
9    to each of the one or more sets of security devices 1 include sending configuration  
10    instructions to one or more security devices on the first network path and on the  
11    second network path in parallel, including for sending configuration instructions to at  
12    least some of the security devices on the first network path sequentially, beginning  
13    with a first security device on the first network path that is ordered to be a last one of  
14    the security devices on the first network path to receive communications from the  
15    management source.

1    21. A computer-readable medium as recited in Claim 17, wherein:  
2    instructions for detecting that implementing the security policy will cause an address  
3    translation alteration between a management source and a plurality of security devices  
4    include instructions for detecting that implementing the security policy will cause a  
5    natural address translation between the management source and one of the plurality of  
6    security devices.

1    22. The computer-readable medium as recited in Claim 17, wherein:  
2    instructions for detecting that implementing the security policy will cause an address  
3        translation alteration between a management source and a plurality of security devices  
4        include instructions for detecting that implementing the security policy will cause a  
5        static address translation between the management source and one of the plurality of  
6        security devices.

1    23. A computer-readable medium as recited in Claim 17, wherein:  
2    instructions for detecting that implementing the security policy will cause an address  
3        translation alteration between a management source and a plurality of security devices  
4        include instructions for detecting that implementing the security policy will cause a  
5        tunneling translation between the management source and one of the plurality of  
6        security devices

1       24. A computer-readable medium as recited in Claim 17, wherein:

2       instructions for detecting that implementing the security policy will cause an address

3           translation alteration between a management source and a plurality of security devices

4           include instructions for detecting that implementing the security policy will cause a

5           natural address translation;

6       instructions for identifying one or more sets of security devices that would each have one or

7           more configuration dependencies as a result of the address translation alteration

8           include instructions for identifying a first network path that interconnects the

9           management source and a first set of the one or more security devices in series; and

10      instructions for sending one or more configuration instructions from the management source

11           to one or more sets of security devices include instructions for sending configuration

12           instructions to at least some of the security devices on the first network sequentially,

13           beginning with a first security device on the first network path that is ordered to be a

14           last one of the security devices on the first network path to receive communications

15           from the management source.

1       25. A computer-readable medium as recited in Claim 17, wherein:

2       instructions for detecting that implementing the security policy will cause an address

3           translation alteration between a management source and a plurality of security devices

4           include instructions for detecting that implementing the security policy will cause a

5           static address translation on the first network path;

6       instructions for identifying one or more sets of security devices that would each have one or

7           more configuration dependencies as a result of the address translation alteration

8           include instructions for identifying a first network path that interconnects the

9           management source and a first set of the one or more security devices in series; and

10      instructions for sending configuration instructions from the management source to one or

11       more sets of security devices include instructions for sending configuration

12       instructions to one or more security devices on the first network path using the order

13       of either (i) sending configuration instructions to each security device of the first

14       network path that is ordered in series between the management source and the static

15       address translation before sending configuration instructions from the management

16       source to any of the other security devices that are ordered in series after the static

17       address translation, or (ii) sending configuration instructions to all of the other

18       security devices that are ordered in series after the static address translation before

19       sending configuration instructions from the management source to each security

20       device that is ordered between the management source and the static address

21       translation.

1       26. A computer-readable medium as recited in Claim 17, wherein:  
2       instructions for detecting that implementing the security policy will cause an address  
3            translation alteration between a management source and a plurality of security devices  
4            include instructions for detecting that implementing the security policy will cause a  
5            tunneling translation on the first network path;  
6       instructions for identifying one or more sets of security devices that would each have one or  
7            more configuration dependencies as a result of the address translation alteration  
8            include instructions for identifying a first network path that interconnects the  
9            management source and a first set of the one or more security devices in series; and  
10      instructions for configuration instructions from the management source to one or more sets of  
11        security devices include instructions for sending configuration instructions to one or  
12        more security devices on the first network path using the order of either (i) sending  
13        configuration instructions to each security device of the first network path that is  
14        ordered in series between the management source and the static address translation  
15        before sending configuration instructions from the management source to any of the  
16        other security devices that are ordered in series after the static translation, or (ii)  
17        sending configuration instructions to all of the other security devices that are ordered  
18        in series after the static translation before sending configuration instructions from the  
19        management source to each security device that is ordered between the management  
20        source and the tunneling translation.

1       27. A computer system for deploying configuration instructions to security devices in  
2       order to implement a security policy in a network, the computer system comprising:  
3                   means for detecting that implementing the security policy will cause an  
4                   address translation alteration between a management source and a  
5                   plurality of security devices for implementing the security device on  
6                   the network;  
7                   means for identifying, from the plurality of security devices, one or more sets  
8                   of security devices that would each have one or more configuration  
9                   dependencies as a result of the address translation alteration; and  
10                  means for sending configuration instructions from the management source to  
11                  each of the one or more sets of security devices in order to implement  
12                  the security policy.

1       28. A management device for deploying configuration instructions to a plurality of  
2       security devices in order to implement a security policy on a network, the management  
3       device comprising:  
4                  a processor configured to:  
5                   detect that implementing the security policy will cause an address translation  
6                   alteration between a management source and a plurality of security  
7                   devices for implementing the security device on the network;  
8                  identify, from the plurality of security devices, one or more sets of security  
9                   devices that would each have one or more configuration dependencies  
10                  as a result of the address translation alteration; and

11 send configuration instructions from the management source to each of the  
12 one or more sets of security devices using an order that is determined  
13 by the one or more configuration dependencies, so as to implement the  
14 security policy on the network.